

HIGH TIDES.

Cape Lookout, North Carolina, 2d: very high tide, covering the whole island, and drowning a large number of sheep and cattle. High tides also occurred at this station on the 3d, 4th, 6th, 7th, 8th, 15th, 18th, 19th, 20th, 22d.

Punta Rassa, Florida, 21st.

ICE IN RIVERS AND HARBORS.

Lake Erie.—Buffalo, New York: the lake at this place was clear of ice on the 5th.

Lake Superior.—Duluth, Minnesota, 2d: the barge "Osceola" departed on this date, being the first boat to leave this port for the lower lakes.

Marquette, Michigan, 5th: the barge "Osceola" was the first boat of the season to arrive from Duluth, Minnesota. The passenger steamers "Saint Paul" and "Winslow" arrived on the 10th, and reported having encountered considerable ice. On the 17th, the inner harbor became filled with ice. On the 18th, the captain of the steamer "Toledo" reported that the ice extended along the shore of the lake from this place to the mouth of Saint Mary's river, and in places it extended lakeward for a distance of fourteen miles.

Devil's lake.—Fort Totten, Dakota: the lake became clear of ice at this place on the 13th.

TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors at the Signal-Service stations, with the average depth at which the observations were made, are given in the following table. In this table is also shown the mean temperature of the air at the various stations, and the monthly ranges of water temperature. The smallest monthly ranges are as follows: Portland, Maine, 3°.7; Eastport, Maine, 4°.6; Smithville, North Carolina, 5°; Duluth, Minnesota, 6°.5; Pensacola, Florida, 6°.5. The largest are: Buffalo, New York, 23°.5; Cedar Keys, Florida, 20°.5; Alpena, Michigan, 20°.4; New Haven, Connecticut, 17°.5; Toledo, Ohio, 17°.1.

Temperature of Water for May, 1883.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey.....	58.6	47.0	11.0	ft. in.	56.7
Alpena, Michigan.....	58.4	38.0	20.4	11 2	44.0
Augusta, Georgia.....	79.0	62.0	17.0	8 1	70.5
Baltimore, Maryland.....	66.0	54.0	12.0	9 8	64.0
Block Island, Rhode Island.....	54.6	43.7	10.9	8 11	52.6
Boston, Massachusetts.....	59.1	45.7	13.4	21 3	55.5
Buffalo, New York.....	59.0	35.5	23.5	10 1	50.0
Cedar Keys, Florida.....	86.0	65.5	20.5	10 10	75.1
Charleston, South Carolina.....	75.1	65.0	10.1	39 11	70.8
Chicago, Illinois.....	54.7	49.2	5.5	7 4	52.1
Chincoteague, Virginia.....	71.0	55.0	16.0	5 8	60.0
Cleveland, Ohio.....	56.7	44.4	12.3	14 0	54.2
Detroit, Michigan.....	55.0	45.0	10.0	23 7	54.0
Delaware Breakwater, Delaware.....	61.4	49.5	11.9	9 3	58.1
Duluth, Minnesota.....	44.0	37.5	6.5	14 10	45.5
Eastport, Maine.....	41.7	37.1	4.6	15 7	47.4
Escanaba, Michigan.....	50.0	37.5	12.5	15 0	45.1
Galveston, Texas.....	79.0	71.0	8.0	12 8	75.6
Grand Haven, Michigan.....	63.7	50.1	13.6	19 0	56.6
Indianola, Texas.....	81.5	73.6	7.9	9 4	76.2
Jacksonville, Florida.....	81.0	72.0	9.0	18 0	73.9
Key West, Florida.....	86.4	78.2	8.2	17 1	79.5
Mackinaw City, Michigan.....	43.8	32.8	11.0	13 0	44.7
Marquette, Michigan.....	43.0	35.0	8.0	9 10	44.0
Millwaukee, Wisconsin.....	53.0	42.6	10.4	8 0	49.6
Mobile, Alabama.....	77.0	69.5	7.5	17 0	72.0
New Haven, Connecticut.....	65.7	48.2	17.5	15 1	56.5
New London, Connecticut.....	58.0	45.0	13.0	12 7	56.6
New York City.....	61.5	46.7	14.8	17 4	59.0
Norfolk, Virginia.....	72.0	58.0	14.0	16 11	66.3
Pensacola, Florida.....	78.6	73.1	5.5	17 9	72.2
Portland, Maine.....	44.7	41.0	3.7	18 11	54.9
Portland, Oregon.....	59.8	47.6	12.2	62 5	57.4
Provincetown, Massachusetts.....	59.0	44.5	14.5	14 0	53.9
Punta Rassa, Florida.....	87.5	76.1	11.4	11 1	75.3
Sandy Hook, New Jersey.....	56.0	46.2	9.8	1 5	58.6
San Francisco, California.....	61.8	52.6	9.2	29 4	56.8
Savannah, Georgia.....	76.8	66.9	9.9	12 4	72.7
Smithville, North Carolina.....	71.0	56.0	5.0	10 0	68.5
Toledo, Ohio.....	64.3	47.2	17.1	11 7	55.8
Wilmington, North Carolina.....	74.5	60.0	14.5	13 0	69.0

* No observations from 1st to 14th inclusive.

† Observations interrupted by ice on the 1st, 2d, and 4th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for May, 1883, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 89.54 per cent. The percentages for the four elements are: weather, 93.28; direction of the wind, 90.01; temperature, 89.06; barometer, 85.74 per cent. By geographical districts, they are: For New England, 85.58; middle Atlantic states, 87.50; south Atlantic states, 91.13; eastern Gulf, 93.82; western Gulf, 92.42; lower lakes, 89.53; upper lakes, 87.43; Ohio valley and Tennessee, 90.72; upper Mississippi valley, 89.50; Missouri valley, 87.87.

There were twenty-six omissions to predict out of 3,720, or 0.70 per cent. Of the 3,694 reductions that have been made, seventy-three, or 1.98 per cent., are considered to have entirely failed; seventy-three, or 1.98 per cent., were one-fourth verified; three hundred and thirty-one, or 8.96 per cent., were one-half verified; three hundred and seventy-two, or 10.07 per cent., were three-fourths verified; 2,845 or 77.01 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During May, 1883, one hundred and thirty-nine cautionary signals were displayed. Of these, one hundred and seventeen, or 84.17 per cent., were justified by winds of twenty five miles or more per hour, at or within one hundred miles of the station. Six cautionary off-shore signals were ordered, of which three, or 50.0 were justified both as to direction and velocity, and the remaining three were justified as to velocity, but not as to direction. Fifteen cautionary signals were changed to off-shore signals. One hundred and forty-five signals, of all kinds, were displayed, of which one hundred and twenty, or 82.76 per cent., were fully justified. These do not include signals ordered at display stations, where the velocity of the wind is only estimated. Eleven signals were ordered late. One hundred and twenty-nine winds of twenty-five miles or over per hour were reported, for which no signals were ordered; many of these were high local winds or strong sea-breezes.

ATMOSPHERIC ELECTRICITY.

AURORAS.

But few auroral displays were reported during the month, none of which were noted for brilliancy or extent of observation.

On the 1st a display was observed at Saint Vincent, Minnesota; Toronto, Ontario; Newport, Vermont; Charlottetown, Prince Edwards' Island; Sydney, Nova Scotia, and on the summit of Mount Washington. At the latter station it was seen from 10.15 p. m. until midnight. It extended over about 40° of the northern horizon, and to an altitude of 20°.

Auroral displays were observed on other dates as follows:

2d.—Eastport, Maine: a faint display was observed at 11.30 p. m.

3d.—Litchfield, Michigan.

4th.—Eastport, Maine: faint straw-colored auroral light observed from 11 p. m. until the morning of the 5th. This display was also reported to have been visible at Oswego, New York, at 2 a. m. of the 5th.

5th.—Lansing, Michigan; Vevay, Indiana.

6th.—Saint Vincent, Minnesota: faint auroral arch observed at 9.40 p. m., extending over about 40° of the northern horizon, and to an altitude of 40°.

8th.—Vevay, Indiana.

9th.—Fort Assiniboine, Montana.

13th.—Eastport, Maine: a faint auroral light was visible from 9 p. m. until the morning of the 14th. This display was also seen at Gardiner, Maine, and Toronto, Ontario.

16th.—Sussex, Wisconsin: An aurora was observed from 8.30 to 8.45 p. m.

19th.—Woodstock, Maryland: An aurora was observed at

9.45 p. m. Although the moon was full, the display was very distinct.

The following report is taken from "Nature" of June 7, 1883:

"On May 19th, at about 10 p. m., a remarkable aurora-borealis was observed at Ludvika, in Sweden. It began as a faint band of light parallel with the horizon, which gradually grew broader and broader. The extraordinary feature of the phenomenon was, however, that this band had the appearance of an ice-covered lake on which the moon was shining. Promontories and shores covered with trees were seen, and also the faint outlines of farms. This phenomenon lasted about ten minutes, when the aurora changed into a suffused pink luminosity, like that of clouds near the setting sun."

20th.—Escanaba, Michigan: straw colored auroral beams were observed in the northern sky after 10 p. m. This display was also observed at Billings, Montana; Humboldt, Iowa; and at the following stations in Minnesota: Moorhead, Northfield, Saint Paul, and Saint Vincent.

21st.—Traverse City, Michigan.

25th.—Ithaca, New York; Sutton, Nebraska.

26th.—Sutton and Red Willow, Nebraska.

27th.—New Haven, Connecticut: a faint aurora was observed in the northern sky from 8 to 11 p. m.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

New England.—8th, 10th, 11th, 14th, 15th, 21st, 22d, 23d, 28th, 29th, 31st.

Middle Atlantic states.—4th, 5th, 7th to 11th, 14th, 15th, 20th, 21st, 22d, 26th to 29th, 31st.

South Atlantic states.—1st, 5th, 9th, 11th, 12th, 14th, 15th, 20th, 21st, 27th, 31st.

Florida peninsula.—1st, 6th, 7th, 13th, 15th, 18th, 29th, 30th, 31st.

Eastern Gulf.—1st, 4th, 9th, 10th, 11th, 14th, 15th, 20th, 26th, 29th, 30th, 31st.

Western Gulf.—3d, 4th, 9th, 10th, 12th, 14th, 17th to 20th, 25th, 26th, 28th, 29th, 30th.

Rio Grande valley.—3d, 4th, 10th, 16th, 17th, 25th, 30th.

Ohio valley and Tennessee.—1st, 3d, 4th, 5th, 7th, 9th, 10th, 11th, 14th, 15th, 17th to 21st, 25th to 31st.

Lower lakes.—1st, 3d, 4th, 5th, 7th, 8th, 10th, 14th, 19th to 22d, 24th to 28th.

Upper lakes.—2d, 3d, 4th, 6th, 7th, 9th, 10th, 13th, 14th, 15th, 18th, 19th, 24th, 25th, 27th, 28th, 30th.

Extreme northwest.—16th, 17th, 24th, 26th, 29th.

Upper Mississippi valley.—1st to 4th, 6th to 10th, 13th to 20th, 23d to 30th.

Missouri valley.—1st, 2d, 3d, 6th to 13th, 16th, 17th, 18th, 23d to 31st.

Northern slope.—1st, 7th, 8th, 11th, 12th, 13th, 15th, 16th, 17th, 21st to 25th, 27th, 28th, 31st.

Middle slope.—1st, 6th, 8th, 12th, 13th, 16th to 19th, 22d to 25th, 28th, 31st.

Southern slope.—4th, 6th, 9th, 11th, 16th, 18th, 19th.

Southern plateau.—12th, 13th, 16th, 31st.

Middle plateau.—7th, 10th, 11th, 12th, 24th, 31st.

Northern plateau.—6th to 13th, 20th, 21st, 24th.

Thunder-storms were also reported from the following states not included in the districts named above:

California.—Benecia Barracks, 6th; Fort Bidwell, 7th; Sacramento, 6th; San Francisco, 11th; Red Bluff, 13th; Visalia, 6th, 10th.

Oregon.—Portland, 10th; Roseburg, 11th.

The following are the most noteworthy instances of damage by lightning that have occurred during May:

On the morning of the 3d, the barge "C. F. Allen," while lying at Muskegon, Michigan, was struck by lightning and burned nearly to the water's edge. The lightning struck the foretopmast and passed down the wire rigging into the hold, setting fire to her cargo of lumber. The barge and cargo are a complete loss. The damage is estimated at \$7,000.

Omaha, Nebraska, 8th.—During a heavy thunder-storm on

the morning of this date, the telephone office and several other buildings in this city were badly damaged by lightning.

Cedar Rapids, Linn county, Iowa, 9th.—The Union depot was struck by lightning a 3 p. m. of this date, and was partially destroyed.

Lebanon, Saint Clair county, Illinois, 14th.—About four miles north of this place, a barn in which were stored grain, hay, and farming implements, was struck by lightning and consumed.

Jersey City, New Jersey, 10th.—At 3.30 a. m., of this date, an oil tank in the National Storage company's works, at Communipaw, was struck by lightning. A terrific explosion followed, which was heard for miles around. The fire spread rapidly and was not under control for several hours. During the afternoon and early evening, about one and one-half miles of water were covered by the burning oil. The flames consumed everything on seven acres of ground. This conflagration resulted in the loss of eight lives, and the destruction of the following property: twelve oil tanks, each containing 20,000 barrels of crude oil; two large storage houses, containing 1,500 barrels of oil; eighteen cars; three docks; six unloaded barges; three small brick buildings; and the engine room, office, and machine shops. The total loss is estimated at \$1,500,000.

New York City, 9th.—A sash and blind factory in this city was struck by lightning on this date, causing damage to the stock and building, estimated at \$19,000.

Jamaica, Long Island, 14th.—During a violent thunder-storm which passed over this place between 10 and 11 p. m., the lightning caused much damage at various points on Long Island. At Springfield, a residence was damaged to the extent of \$15,000, and all of the inmates were severely injured. At Foster's Meadow, a barn containing hay, grain, farming implements, horses, and cattle was destroyed. Other damage was done at Washington Square and South Woodhaven.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England.—1st, 6th, 8th, 12th, 13th, 14th, 16th, 18th, 19th, 30th.

Middle Atlantic states.—1st, 2d, 3d, 5th, 7th, 8th, 11th, 13th, 14th, 15th, 17th, 18th, 19th, 25th, 28th, 29th.

South Atlantic states.—5th, 11th, 12th, 13th, 18th, 19th, 25th.

Eastern Gulf.—3d, 4th, 12th, 16th, 19th, 20th, 24th, 25th, 27th.

Western Gulf.—1st to 4th, 9th, 13th, 15th to 19th, 22d, 24th to 28th.

Ohio valley and Tennessee.—3d, 4th, 6th, 10th, 12th, 13th, 14th, 16th, 17th, 19th, 24th, 25th, 28th, 29th.

Lower lakes.—1st, 3d, 4th, 8th, 9th, 13th, 14th, 15th, 17th, 18th, 19th, 25th to 28th.

Upper lakes.—1st, 3d, 6th to 9th, 11th, 13th, 15th, 17th, 24th, 25th, 26th.

Extreme northwest.—1st, 2d, 5th, 14th to 17th, 23d.

Upper Mississippi valley.—1st, 3d, 7th, 10th, 12th, 13th, 16th, 18th, 22d to 25th, 27th, 28th.

Missouri valley.—3d, 5th, 6th, 7th, 15th, 17th, 20th, 23d to 28th, 31st.

Southern plateau.—2d, 3d, 11th.

Middle plateau.—4th, 9th, 10th, 14th, 16th, 21st, 23d.

Northern plateau.—4th, 9th, 14th, 20th, 22d, 24th to 27th, 31st.

North Pacific.—10th, 20th, 21st, 22d, 31st.

Middle Pacific.—2d to 7th, 9th, 10th, 11th, 13th, 14th, 17th, 21st, 22d, 26th, 27th, 28th, 31st.

Solar halos were also observed at the following stations not included in the district named above:

Pike's Peak, Colorado, 10th; West Las Animas, Colorado, 10th; Punta Rassa, Florida, 24th; Terry's Landing, Montana, 17th; North Platte, Nebraska, 5th; Red Willow, Nebraska, 3d, 5th, 7th; Eagle Pass, Texas, 24th.